

Appendicitis in Pregnancy

Background

1. Definition
 - Inflammation of the appendix
2. Most common non-obstetric emergency requiring surgery during pregnancy
3. Physiologic and anatomic changes during pregnancy result in delayed diagnosis, increased morbidity for mother and fetus, and fetal loss
4. Displacement of appendix by uterus and increased separation of visceral and parietal peritoneum decreases the ability to localize tenderness on examination

Pathophysiology

1. Pathology of disease
 - Base of appendix is in the right iliac fossa
 - With advancing pregnancy appendix is displaced cephalad
 - Pain and tenderness is often felt higher in abdomen
 - Can be caused by mechanical obstruction of appendix lumen due to
 - Fecal stasis, kinking of appendix, peritoneal adhesions, infection-induced swelling of the mural lymphoid tissue, or breakdown of mucosal barrier by invading pathogen
2. Incidence
 - Similar incidence to that in general population (0.05-0.07%)
 - 30% in first trimester
 - 45% in second trimester
 - 25% in third trimester
 - Risk of perforation is higher in pregnancy (43%) vs. in general population (4-9%)
3. Risk factors
 - Bacterial gastroenteritis initiates or exacerbates lymphoid hyperplasia.
 - Viral infections such as mumps, Coxsackie's virus B, and adenovirus cause lymphoid hyperplasia
 - Endemic areas parasitic obstruction
 - Increased levels of female sex hormones
4. Morbidity/ mortality
 - Risk of perforation higher with advanced gestation
 - Rupture results in increased fetal morbidity and mortality
 - Incidence of fetal loss in uncomplicated appendicitis 0-1.5%
 - Ruptured appendicitis 20-35%
 - Ruptured appendix during the third trimester increases the risk for preterm labor
 - Maternal mortality
 - Rare
 - Increases with advancing gestation and perforation

Diagnostics

1. History
 - Abdominal pain almost always present
 - RLQ in 1st trimester
 - Level of umbilicus in 2nd trimester

- Diffuse or RUQ in 3rd trimester
- Nausea nearly always present
- Vomiting in 2/3 cases
- Anorexia much less common presenting sign
- 2. Physical exam
 - Symptoms of appendicitis (similar to those of normal pregnancy)
 - Anorexia
 - Nausea and vomiting
 - Leukocytosis
 - Hypotension & tachycardia (physiologic in pregnancy)
 - Tenderness to palpation in the area of pain
 - Rebound tenderness is present in 55-75% of patients
 - Abdominal muscle rigidity is observed in 50-65% of patients
 - Psoas sign (increased pain when patient lies on unaffected side and extends leg against the resistance) is observed less frequently during pregnancy
 - Rectal tenderness is usually present, particularly in the first trimester
 - Presence of fever and tachycardia is variable and are not sensitive findings
- 3. Diagnostic testing
 - CBC
 - In normal pregnancy white blood cell count may be as high as 15,000/mm³
 - Severe infection can occur with a normal count
 - Neutrophils often >80% with bandemia when appendicitis is present
 - Urinalysis
 - Pyuria is observed in 10-20%
- 4. Diagnostic imaging
 - Upright abdominal radiograph:
 - In severe dz, right-sided mass or free air may be visualized
 - Graded compression ultrasound
 - Highly sensitive and specific in early gestation, yield decreased after 35 weeks
 - MRI
 - Helpful when clinical findings and ultrasound are inconclusive
 - Does not have any radiation exposure
 - Spiral CT
 - Useful in advanced gestation when MRI not available
 - Specific views, 5-mm slices mid –L2 to symphysis cause radiation exposure 300 mrad
 - Well below accepted safe level of radiation exposure in pregnancy of 5 rad
- 5. Note:
 - Appendectomy can be done without imaging studies even at the expense of removing normal appendix
 - Undue delays for imaging study should be avoided to prevent perforation

Differential Diagnosis

1. Threatened abortion
2. Abruptio placenta
3. Preterm labor

4. Round ligament pain
5. Degenerating fibroid
6. Adnexal torsion
7. Pyelonephritis
8. Cholecystitis
9. Pancreatitis
10. Gastroenteritis

Therapeutics

1. Laparoscopic appendectomy with regional anesthesia:
 - Preferred in uncomplicated appendicitis <20 weeks
 - Advantages:
 - Shorter recovery and lower post-op pain
 - Regional anesthesia preferred in un complicated, stable patients
 - Complications:
 - Possible CO2 pneumoperitoneum causing fetal acidosis and hypoperfusion , incidence of this complication is less with experienced surgeon
2. Open appendectomy with regional anesthesia:
 - Preferred after 20 weeks
3. Open appendectomy with general anesthesia (for faster access)
 - Consider for pts with suspected perforation, peritonitis
4. Before exploration IV antibiotics begun with 2nd generation or 3rd generation penicillin
 - Typically Abx are discontinued post surgery except in gangrenous perforation or a periappendiceal phlegmon where they are continued post surgery
5. Complications of treatment
 - Uterine contractions - value of tocolytics not proven
 - Abortion and preterm labor, especially with peritonitis
 - Risk of spontaneous labor higher after 23 weeks
 - Overall fetal loss 15%

Follow-Up

1. Office follow up visit is scheduled within 48 hr after surgery
2. Earlier follow-up advised with any signs and symptoms of infection or sepsis

Prevention

1. High fiber diet prevents constipation and fecal stasis
2. Avoiding infections like Amebiasis, bacterial gastroenteritis, mumps, and adenovirus might prevent acute appendicitis

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